Notice of Allowability	Application No.	Applicant(s)	
	10/791,244	YANG ET AL.	
	Examiner	Art Unit	
	Juan A. Torres	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *Amendment - After Non-Final Rejection filed on 09/25/2007*.

2. ☒ The allowed claim(s) is/are *2-6, 8-12, 14-18, 20-24 and 26-32 (renumbered 1-27)*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____.
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

   Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Allowable Subject Matter

Claims 2-6, 8-12, 14-18, 20-24 and 26-32 (renumbered 1-27) are allowed.

The following is an examiner's statement of reasons for allowance: Claims 2-6, 8-12, 14-18, 20-24 and 26-32 (renumbered 1-27) are allowed because a comprehensive search of prior art failed to teach, either alone or in combination, a method for data estimation in a wireless communications system, the method comprising: producing a received vector; determining a past, a center and a future portion of a channel estimate matrix for a desired portion of the data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion, estimating the desired portion of the data without effectively truncating detected data using a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector; using the past and future portions of the channel estimate matrix for adjusting factors in the minimum mean square error algorithm, and adjusting the received vector prior to input into the minimum mean square error algorithm using the past portion of the channel estimate matrix and data previously estimated for a portion of the received vector associated with the past portion of the channel estimate matrix; a method for data estimation in a wireless communications system, the method comprising producing a received vector, determining a past, a center and a future

portion of a channel estimate matrix for a desired portion of the data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion, estimating the desired portion of the data without effectively truncating detected data using a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector, using the past and future portions of the channel estimate matrix for adjusting factors in the minimum mean square error algorithm, and producing a noise factor using the prior channel estimate matrix, the future channel estimate matrix and an auto correlation of the noise and the inputs into the minimum mean square error algorithm are the noise factor, the center portion of the channel estimate matrix and the portion of the received vector; a wireless transmit/receive unit comprising a receiver component configured to produce a received vector, a matrix determination component configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion, a data estimation component configured to estimate the desired portion of the data without effectively truncating detected data, the estimating the desired portion of the data uses a minimum

mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector, the data estimation component configured to use the past and future portions of the channel estimate matrix for adjusting factors in the minimum mean square error algorithm, and the data estimation component configured to adjust the received vector prior to input into the minimum mean square error algorithm using the past portion of the channel estimate matrix and data previously estimated for a portion of the received vector associated with the past portion of the channel estimate matrix; a wireless transmit/receive unit comprising a receiver component configured to produce a received vector, a matrix determination component configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion, a data estimation component configured to estimate the desired portion of the data without effectively truncating detected data, the estimating the desired portion of the data uses a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector, the data estimation component configured to use the past and future portions of the channel estimate matrix for adjusting factors in the minimum mean square error algorithm, and a component configured to produce a noise factor using the prior channel estimate matrix, the future channel estimate matrix and an auto correlation of

the noise and the inputs into the minimum mean square error algorithm are the noise factor, the center portion of the channel estimate matrix and the portion of the received vector; a wireless transmit/receive unit configured to receive at least one signal and to produce a received vector therefrom, the wireless transmit/receive unit comprising a channel estimation matrix device configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion, a minimum mean square error device configured to estimate the desired portion of the data without effectively truncating detected data using a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector, wherein the past and future portions of the channel estimate matrix are used for adjusting factors in the minimum mean square error algorithm, and an adjustment device configured to adjust the received vector prior to input into the minimum mean square error device by using the past portion of the channel estimate matrix and data previously estimated for a portion of the received vector associated with the past portion of the channel estimate matrix; a wireless transmit/receive unit configured to receive at least one signal and to produce a received vector therefrom, the wireless transmit/receive unit comprising a channel estimation matrix device configured to determine a past, a center and a future portion of a channel estimate matrix of a desired

portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion, a minimum mean square error device configured to estimate the desired portion of the data without effectively truncating detected data using a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector, wherein the past and future portions of the channel estimate matrix are used for adjusting factors in the minimum mean square error algorithm, and a noise factor device configured to produce a noise factor using the prior channel estimate matrix, the future channel estimate matrix and an auto correlation of the noise and the inputs into the minimum mean square error algorithm are the noise factor, the center portion of the channel estimate matrix and the portion of the received vector; a base station comprising a receiver component configured to produce a received vector, a matrix determination component configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion, a data estimation component configured to estimate the desired portion of the data without effectively truncating detected data, the estimating the desired portion of the data uses

a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector, the data estimation component configured to use the past and future portions of the channel estimate matrix for adjusting factors in the minimum mean square error algorithm, and the data estimation component configured to adjust the received vector prior to input into the minimum mean square error algorithm using the past portion of the channel estimate matrix and data previously estimated for a portion of the received vector associated with the past portion of the channel estimate matrix; a base station comprising a receiver component configured to produce a received vector, a matrix determination component configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion, a data estimation component configured to estimate the desired portion of the data without effectively truncating detected data, the estimating the desired portion of the data uses a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector the data estimation component configured to use the past and future portions of the channel estimate matrix for adjusting factors in the minimum mean square error algorithm, and a component configured to produce a noise factor using the prior channel estimate matrix, the future channel estimate matrix and an auto correlation of

the noise and the inputs into the minimum mean square error algorithm are the noise factor, the center portion of the channel estimate matrix and the portion of the received vector; a base station configured to receive at least one signal and to produce a received vector therefrom, the wireless transmit/receive unit comprising a channel estimation matrix device configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion, a minimum mean square error device configured to estimate the desired portion of the data without effectively truncating detected data using a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector, wherein the past and future portions of the channel estimate matrix are used for adjusting factors in the minimum mean square error algorithm, and an adjustment device configured to adjust the received vector prior to input into the minimum mean square error device bv using the past portion of the channel estimate matrix and data previously estimated for a portion of the received vector associated with the past portion of the channel estimate matrix; a base station configured to receive at least one signal and to produce a received vector therefrom, the wireless transmit/receive unit comprising a channel estimation matrix device configured to determine a past, a center and a future portion of a channel estimate matrix of a desired portion of data of the received vector, the past

portion associated with a portion of the received signal prior to the desired portion of the data, the future portion associated with a portion of the received vector after the desired portion of the data and the center portion associated with a portion of the received vector associated with the desired data portion, a minimum mean square error device configured to estimate the desired portion of the data without effectively truncating detected data using a minimum mean square error algorithm having inputs of the center portion of the channel estimate matrix and a portion of the received vector, wherein the past and future portions of the channel estimate matrix are used for adjusting factors in the minimum mean square error algorithm; and a noise factor device configured to produce a noise factor using the prior channel estimate matrix, the future channel estimate matrix and an auto correlation of the noise and the inputs into the minimum mean square error algorithm are the noise factor, the center portion of the channel estimate matrix and the portion of the received vector; an integrated circuit comprising an input configured to receive a received vector, a channel estimation device producing a prior, center and future portion of a channel response matrix using the received vector, a future noise auto-correlation device for receiving the future portion of the channel response matrix and producing a future noise auto-correlation factor, a noise auto-correlation device producing a noise auto-correlation factor using the received vector, a summer for summing the future noise auto-correlation factor with the noise auto-correlation factor, a past input correction device for receiving the prior portion of the channel response matrix and prior detected data to produce a past input correction factor, a subtractor subtracting the past input correction factor from the received vector,

and a minimum mean square error device for receiving an output of the summer, an output of the subtractor and the center portion of the channel estimate matrix, the minimum mean square error device producing estimated data; and an integrated circuit comprising an input configured to receive a received vector, a channel estimation device producing a prior, center and future portion of a channel response matrix using the received vector, a noise auto-correlation correction device for receiving the future and prior portions of the channel response matrix and producing a noise auto-correlation correction factor, a noise auto-correlation device producing a noise auto-correlation factor using the received vector, a summer for summing the noise auto-correlation factor with the noise auto- correlation correction factor; a minimum mean square error device for receiving an output of the summer, the center portion of the channel estimate matrix and the received vector, the minimum mean square error device producing estimated data, as the applicant has claimed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is 571-272-3119. The examiner can normally be reached on 8-6 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Juan Alberto Torres
09-26-2007

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SUPERVISORY PATENT EXAMINER